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Managing Water in the West

Status and Trends of Hydropower Production at Glen Canyon Dam

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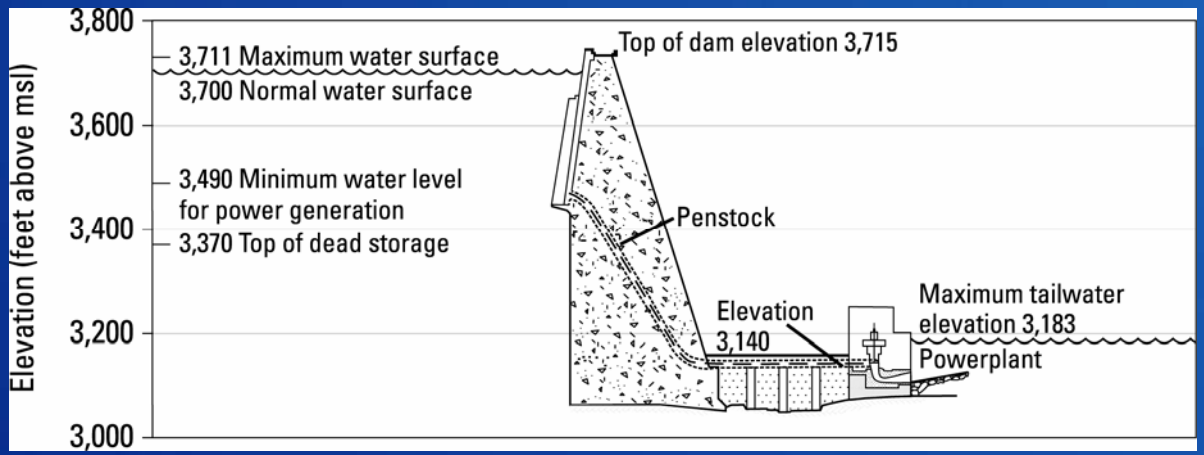
A Few Terms…

- **Megawatt (MW) - Unit of electricity measure.**
- **Megawatt-hour (MWh) – One MW for an hour.**
- **Load- The demand for electricity at a specific time.**
- **Energy - The ability to do work. Generally measured in MWh.**
- **Capacity- A generator's maximum power output level. Typically measured in MW.**
- **Ramprate- The change in release over a one hour period. Often measured in cubic feet per second (cfs)**

Glen Canyon Dam and Powerplant

- 1,320 MW capacity
- Eight Francis turbines
- 710 feet high



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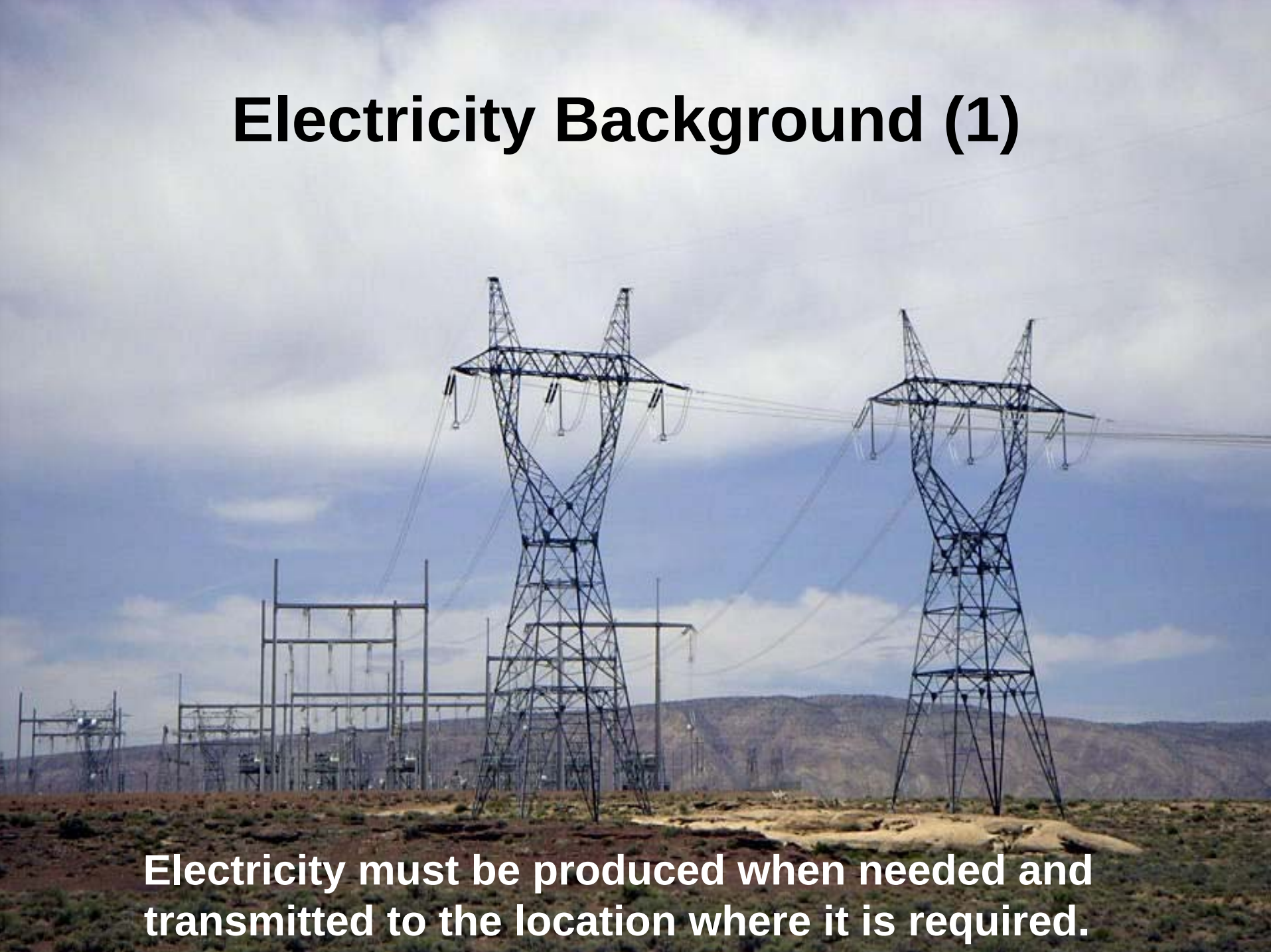
Electricity Background (1)



Electricity must be produced when needed and transmitted to the location where it is required.

Electricity Background (2)

- When you turn on a switch- somewhere in the interconnected electricity system, a generator must increase its output.
- When you turn off a switch- somewhere in the interconnected electricity system, a generator must decrease its output.

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Economic Value (1)

- **Electricity generated by a hydroelectric powerplant is electricity which is not generated by a more expensive thermal powerplant.**

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Economic Value (2)

The economic value of operating the Glen Canyon hydropower plant is the cost avoided by doing so.

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Federal Power

- Large water and power projects have their origins in the dustbowl and great depression era.
- Federal power allocated to preference customers.
- Federal power rates designed for cost recovery.
- Federal wholesale power revenues are approximately 42% to 52% of market revenues.

- Electricity produced at Glen Canyon Dam is marketed by Western Area Power Administration.

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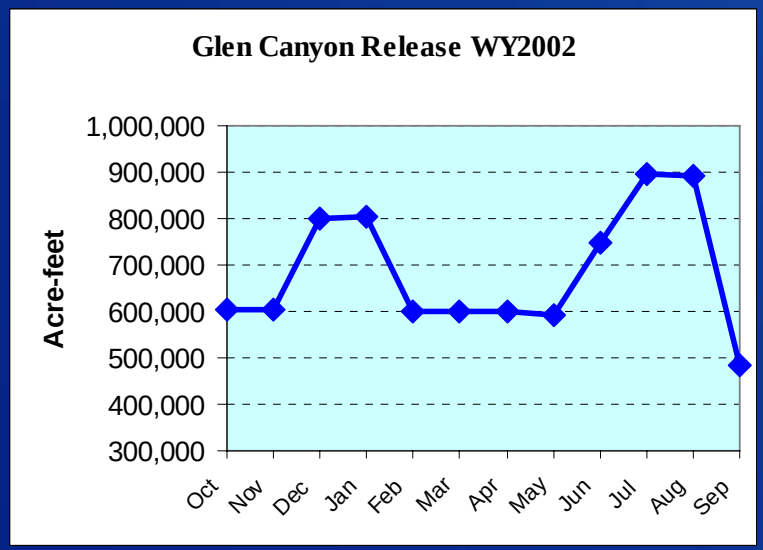
Effects of Environmental Constraints (1)

- Monthly releases from Glen Canyon Dam reflect the Law of the River and CRSP purposes.
- Within these constraints, monthly releases are patterned to coincide with periods of peak seasonal electricity demand.



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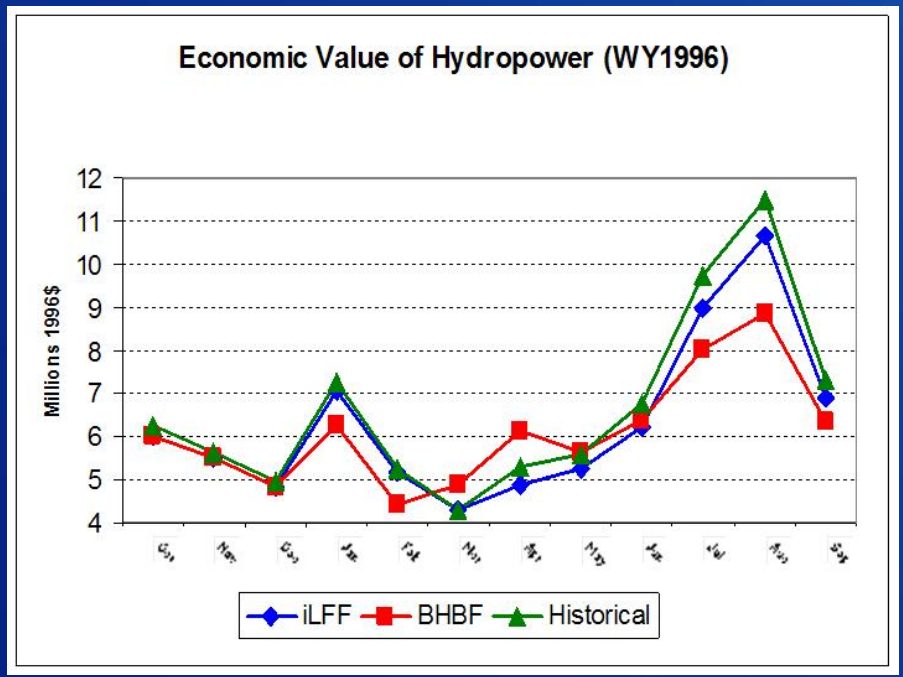
Effects of Environmental Constraints (2)

- Under the MLFF alternative, there are constraints on minimum and maximum release, hourly ramprates and maximum daily changes in release.
- There are also changes in monthly release volumes to facilitate experimental flows.



- In general, changes in monthly release volumes have a greater impact on hydropower production than hourly release constraints.

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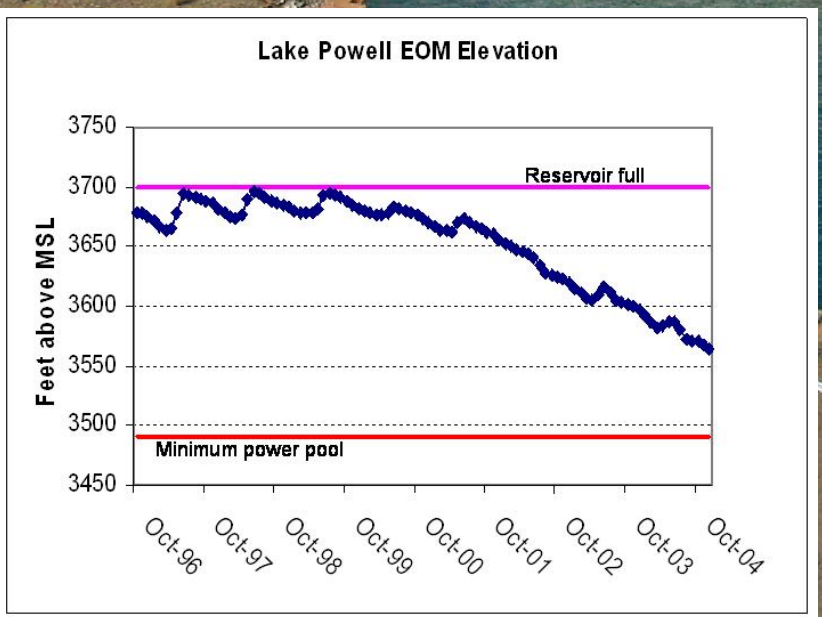
Costs of Environmental Constraints

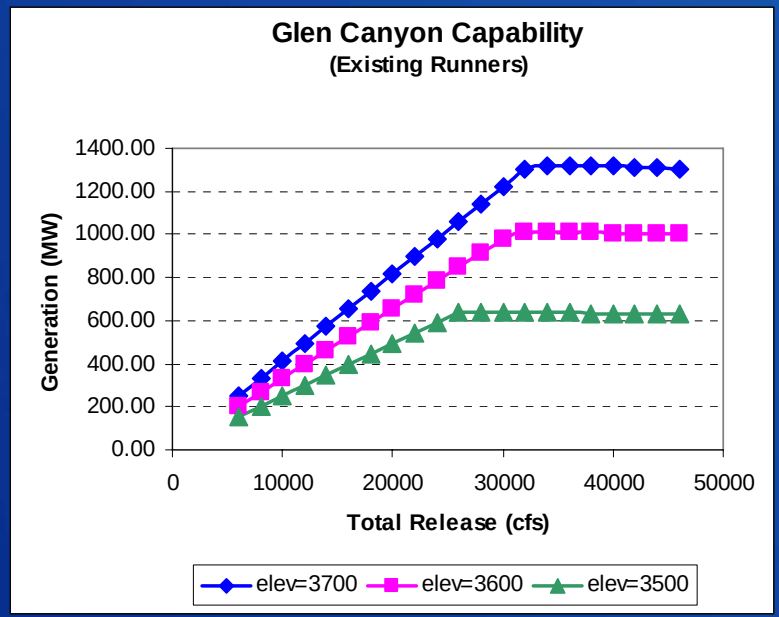
- There have been many economic analyses of changes in the operation of Glen Canyon Dam.
- Only 3 of these contain analyses of the MLFF alternative.
- Due to their purpose, period of analysis, underlying input data and approach, it is impossible to compare the results across these studies.

Status and Trends (1)



Status and Trends (2)

- Lower reservoir elevations reduce head
- At any given release, when the head is lower, generation is reduced



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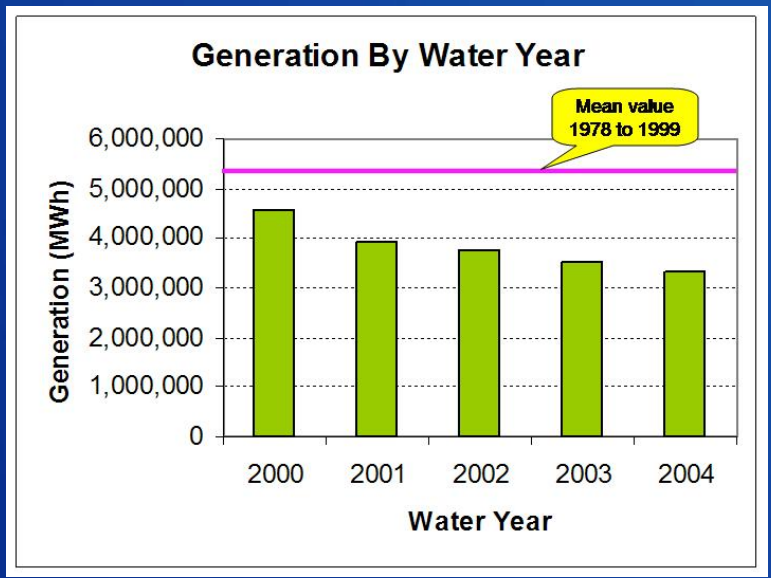
Status and Trends (3)

- Since WY 2001, releases have been about 8.23 maf.
- Reservoir elevations have declined.
- Annual generation has declined.



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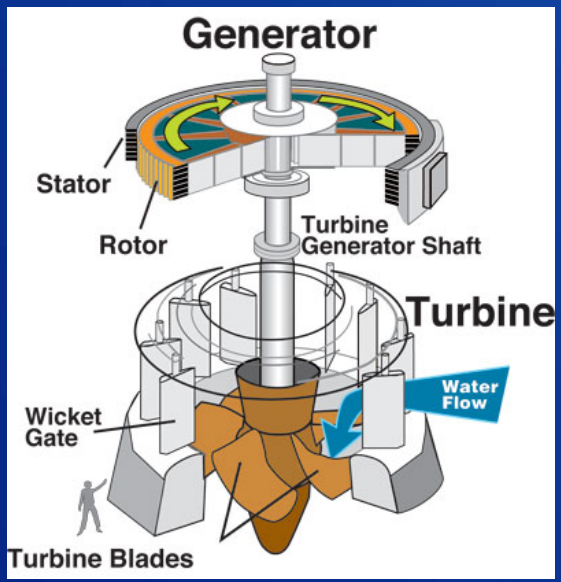
Basin Fund

- Facilitates financial operations of CRSP.
- Fluctuates monthly (just like a checking account).
- Status depends on revenues received and expenses incurred.
- Extensive purchases of replacement power necessitated by the drought have depleted the Basin Fund.
- Western Area Power Administration has taken prudent and fiscally responsible steps to remedy the situation.
- Provisions of CRSP and GCP Acts shift ultimate burden of environmental mitigation and enhancement costs to taxpayers.

Outlook for the Future (1)

- **Installation of more efficient turbines.**
- **Installation of TCDs under consideration.**



USCOE schematic

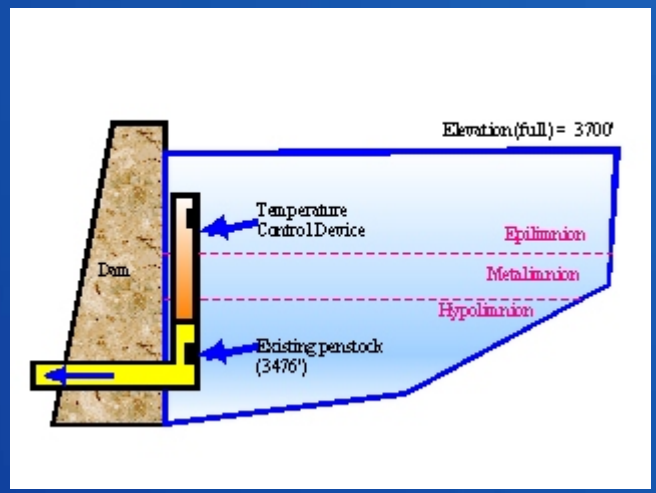


Diagram by author

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Outlook for the Future (2)

- Generally, lower reservoir elevations, generation and capacity.
- Federal power will remain among the lowest-cost sources of electricity in the West.

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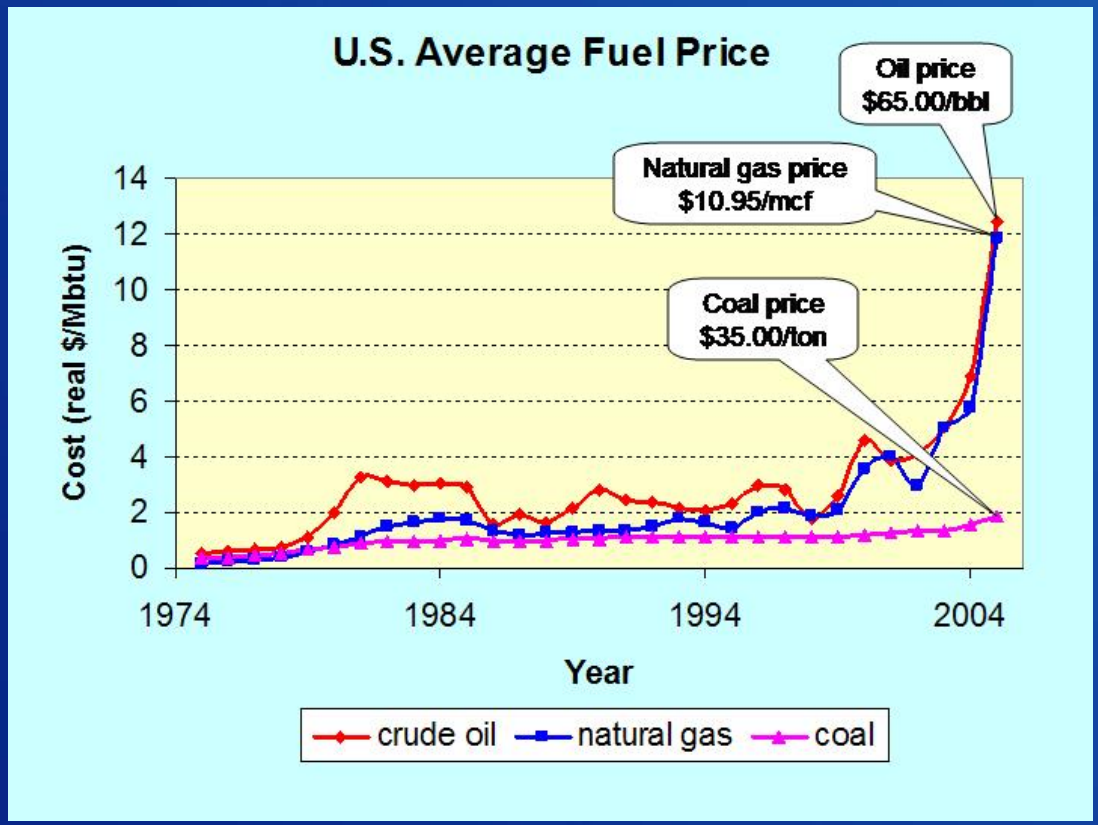
Representative Plant Costs (2003$)

Plant Type	Overnight cost ($/kW)	Fixed O&M cost ($/kW)	Variable O&M ($/MWh)	Fuel Cost ($/MWh)
Coal	1,213	24.36	4.09	10.59
NGCT	374	9.31	2.80	49.04
NGCCCT	558	10.35	1.77	40.25
Oil-Steam	na	8.80	3.64	65.93
Hydro	1,415	12.35	4.80	None
Nuclear	1,957	60.06	0.44	4.53

Note: decommissioning costs not included.

Outlook for the Future



- **Due to recent increases in fossil fuel prices, hydropower will be more valuable in the immediate future.**

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